SPECTRA™ ARF

ALMOST READY-TO-FLY 2-METER ELECTRIC SAILPLANE

INSTRUCTION MANUAL

WARRANTY

Great Planes® Model Manufacturing Co. guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. **In no case shall Great Planes' liability exceed the original cost of the purchased kit.** Further, Great Planes reserves the right to change or modify this warranty without notice.

In that Great Planes has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

If the buyers are not prepared to accept the liability associated with the use of this product, they are advised to return this kit immediately in new and unused condition to the place of purchase.

READ THROUGH THIS INSTRUCTION MANUAL FIRST. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.

GREAT PLANES® MODEL MANUFACTURING COMPANY

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productsupport@greatplanes.com

GPMZ0207 V1.1 For GPMA1050

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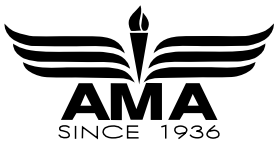
PROTECT YOUR MODEL, YOURSELF & OTHERS...FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS

Your SPECTRA ARF is not a toy, but rather a sophisticated, working model that functions very much like a full-size sailplane. Because of its realistic performance, the SPECTRA ARF**, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage property.**

To make your R/C modeling experience totally enjoyable, we recommend that you get experienced, knowledgeable help with assembly and during your first flights. You'll learn faster and avoid risking your model before you're truly ready to solo. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors. You can also contact the national Academy of Model Aeronautics (AMA), which has more than 2,500 chartered clubs across the country. Through any one of them, instructor training programs and insured newcomer training are available. Contact the AMA at the address or toll-free phone number below.



Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Tele. (800) 435-9262
Fax (765) 741-0057
or via the Internet at http://www.modelaircraft.org

1. Build the plane according to the instructions. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model.

2. Take time to build straight, true and strong.

3. Use an R/C radio system that is in first-class condition, and a correctly sized motor and components (batteries, etc.) throughout your building process.

4. You must properly install all components so that the model operates properly on the ground and in the air.

5. You must check the operation of the model before **every** flight to ensure that all equipment is operating and that the model has remained structurally sound. Be sure to check nylon clevises or other connectors often and replace them if they show signs of wear or fatigue.

Note: We, as the kit manufacturer, provide you with a top quality kit and great instructions, but ultimately the quality of your finished model depends on how **you** build it; therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

Remember: Take your time and follow directions to end up with a well-built model that is straight and true.

Please inspect all parts carefully before starting to build! If any parts are missing, broken or defective, or if you have any questions about building or flying this airplane, please call us at:

(217) 398-8970
or e-mail us at:
productsupport@greatplanes.com.

If you are calling for replacement parts, please reference the part numbers and the kit identification number (stamped on the end of the carton) and have them ready when calling.

INTRODUCTION

The **SPECTRA ARF** is a very stable and predictable aircraft, allowing pilots of differing skill levels to enjoy it. It is easy to build, flies great, and would be a great selection as your first R/C airplane.

PREPARATIONS

Required Accessories

Items in parentheses (GPMQ4243) are suggested part numbers recognized by most distributors and hobby shops and are listed for your ordering convenience. GPM is the Great Planes brand, TOP is the Top Flite® brand, HCA is the Hobbico® brand.

- ❏ Minimum three-channel radio with two standard servos
- ❏ Electronic Speed Controller with BEC
- ❏ 6 or 7-cell rechargeable battery

Building Supplies & Tools

These are the building supplies and tools that are required. We recommend Great Planes Pro™ CA and Epoxy glue.

- ❏ Pacer Formula 560 canopy glue (PAAR3300)
- ❏ Plastic wrap or wax paper
- ❏ Hobby knife and #11 blades (HCAR0105)
- ❏ 1/2" [13mm] Latex foam rubber padding (HCAQ1050)
- ❏ Phillips screwdriver
- ❏ Pliers
- ❏ Great Planes Pro Thin CA (1/2oz) (GPMR6001)
- ❏ Great Planes Pro Medium CA (1/2oz) (GPMR6007)
- ❏ Great Planes Pro Threadlocker (GPMR6060)
- ❏ Hand or electric drill with 1/16" [1.6mm], 3/32" [2.3mm], 9/64" [3.6mm] and drill bits

Optional Supplies & Tools

- ❏ Top Flite Sealing Iron (TOPR2100)
- ❏ Top Flite Heat Gun (TOPR2000)
- ❏ Hobbico single-edge razor blades (HCAR0312)
- ❏ Hobbico Curved Tip Canopy Scissors for trimming plastic parts (HCAR0667)

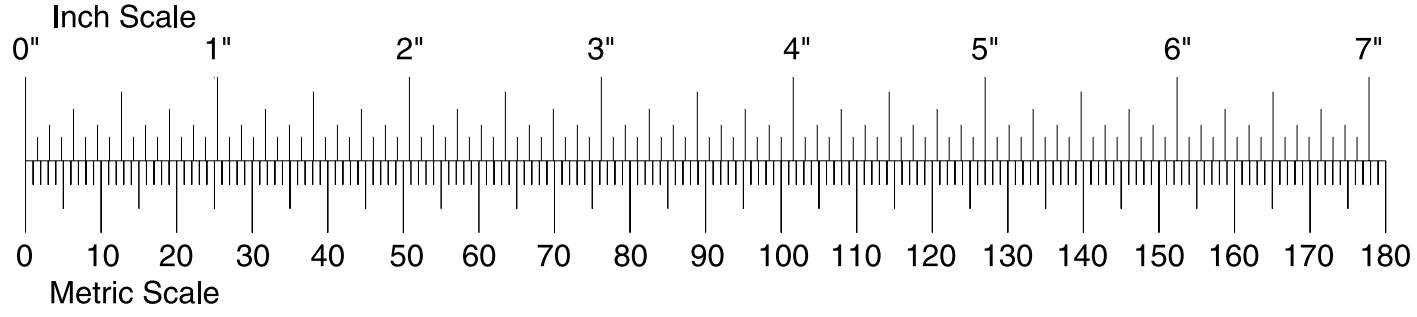
General Inspection

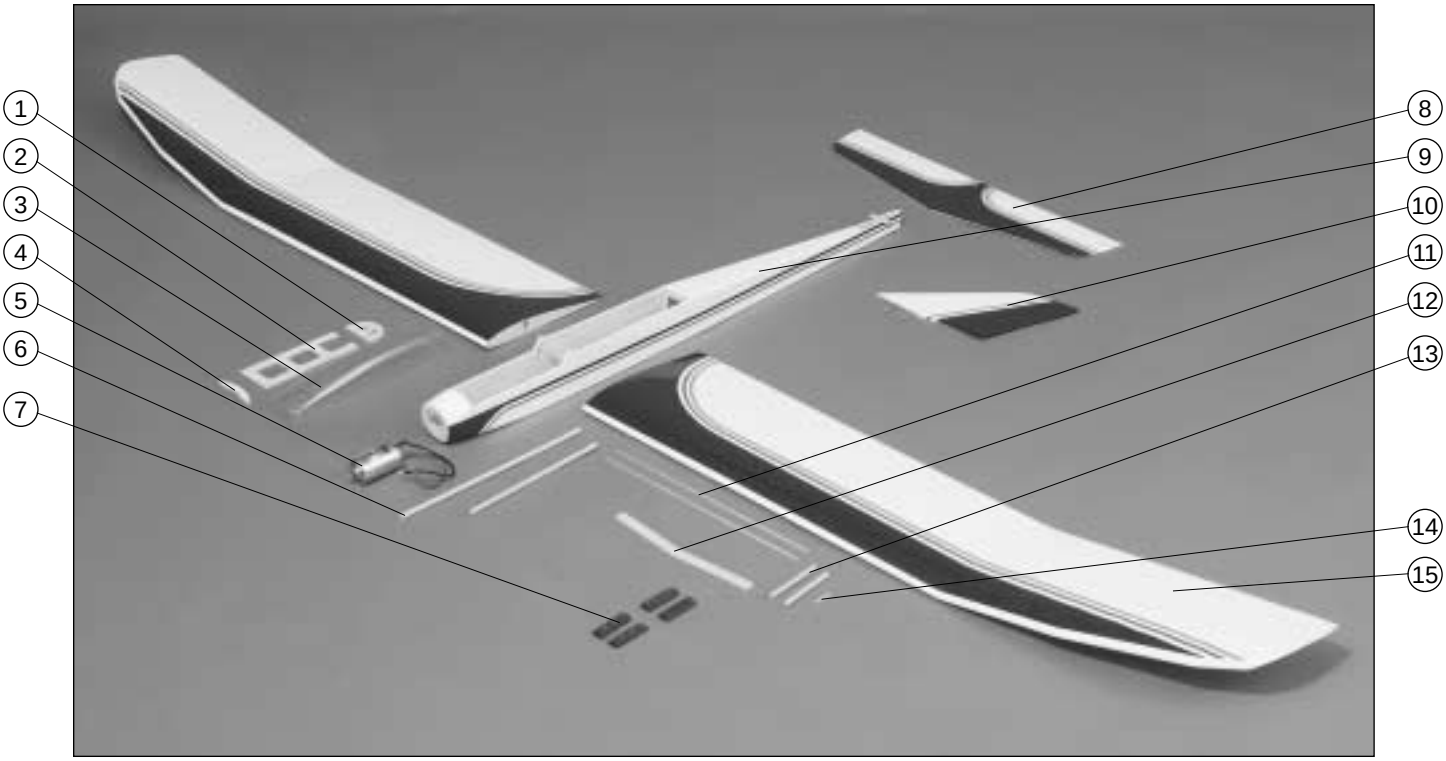
Remove the fuselage, wing panels, rudder assembly and stabilizer assembly from their individual bags. **Inspect all items closely to check for any damage.** If any damage is found, **contact the place where your SPECTRA ARF was purchased, or Hobby Services,** to obtain a replacement for your damaged items. If any of the control surfaces are attached, simply **pull them apart and store the hinges in a safe place until it is time to re-attach them.**

Your **SPECTRA ARF** is covered using **Top Flite MonoKote®** covering. Eliminate any wrinkles you find in the covering by shrinking them away with a **heat gun.** Then, **apply pressure to the area with a covering iron and a hot sock.** This will securely bond the covering to the wood so the wrinkles will be less likely to reappear in the future.

Important Building Notes

Several times during construction we refer to the **"top"** or **"bottom"** of the model or a part of the model. It is understood that the "top" or "bottom" of the model is as it would be when the airplane is **right side up** and will be referred to as the "top" even if the model is being worked on upside-down.





PARTS LIST

Key #	Description	Qty	Key #	Description	Qty
1	REAR CANOPY BRACE	1	9	FUSELAGE	1
2	CANOPY BRACE BRACE	1	10	FIN & RUDDER	1
3	CANOPY	1	11	METAL PUSHRODS	2
4	FRONT CANOPY BRACE	1	12	WING JOINER	1
5	MOTOR	1	13	WING DOWELS	2
6	DOWEL PUSHRODS	2	14	CANOPY DOWEL	1
7	SHRINK TUBING	1	15	WING (TWO HALVES)	1
8	STAB & ELEVATOR	1			

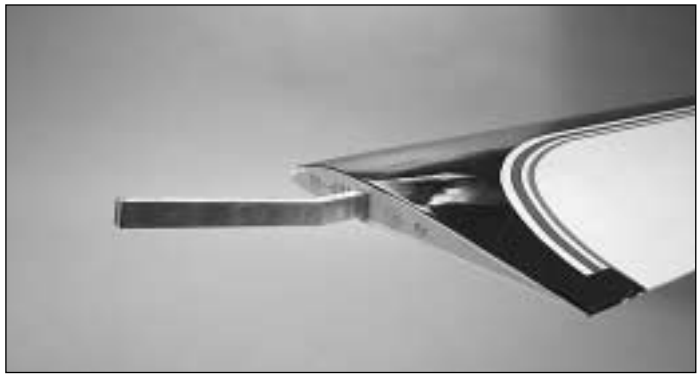
REPLACEMENT PARTS

If needed, replacement parts for your Spectra ARF are available through your hobby supplier.

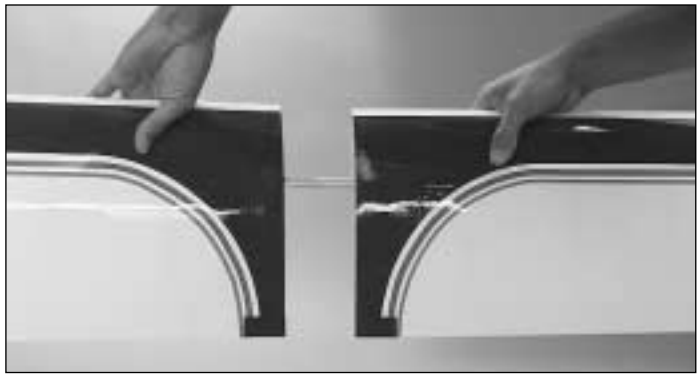
GPMA2340 ....Wing Kit
GPMA2341 ....Fuselage
GPMA2342 ....Tail Set
GPMA2343 ....Motor
GPMA2344 ....Battery
GPMA2345 ....ESC
GPMQ1690 .....8 x 4 Folding Prop

ASSEMBLY

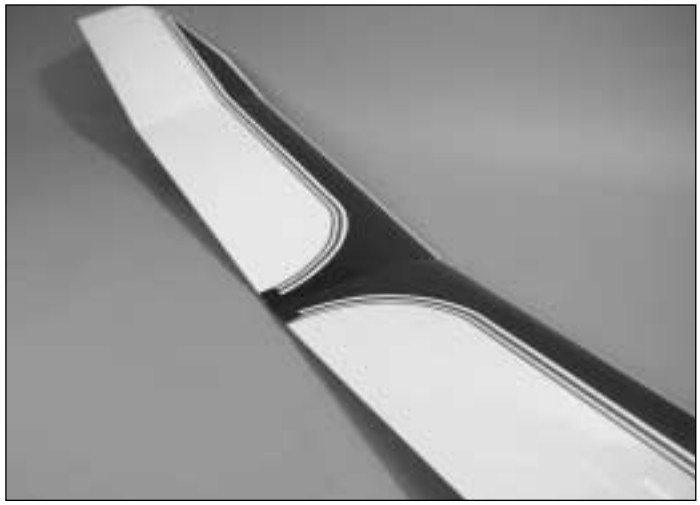
Wing Assembly



❏ 1. Locate the wing joiner and insert it into the right wing joiner pocket as shown in the above picture.

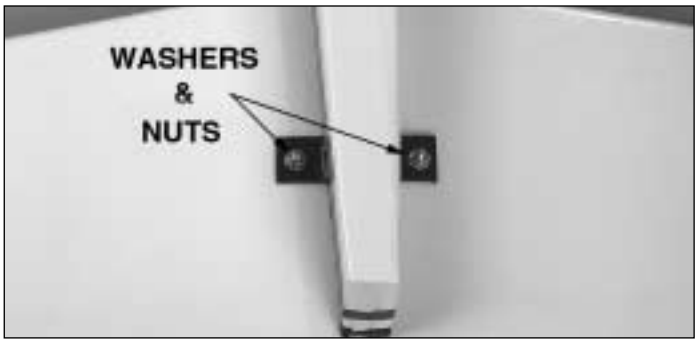


❏ 2. Insert the other side of the wing joiner into the left wing joiner pocket and slide the wings together.



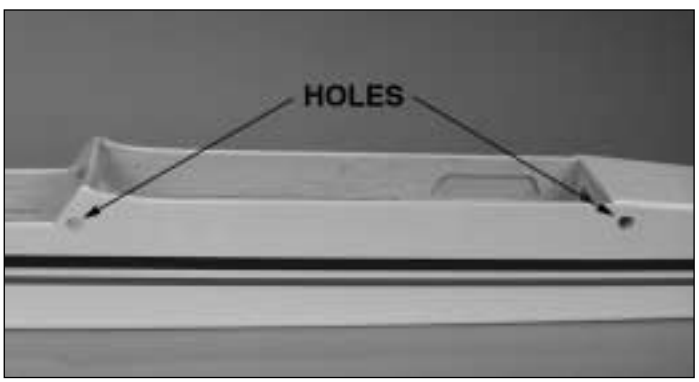
❏ 3. Completed wing

Tail Assembly



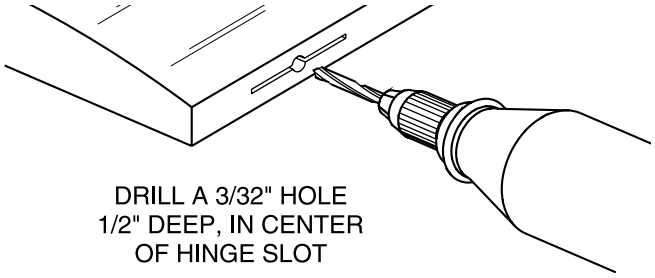
❏ 1. Find and open the holes in the stabilizer covering for the attachment screws. Attach the **stabilizer** to the **fuselage** using two 2mm x 15mm screws, two 2mm nuts and four 2mm washers. Use thread lock on the nuts to prevent loosening.

❏ 2. Open the holes on the top and bottom of the fuselage covering for the fin attachment. Attach the **fin** using two 2mm washers and two 2mm nuts. Use Great Planes Pro Threadlocker on the nuts to prevent loosening.

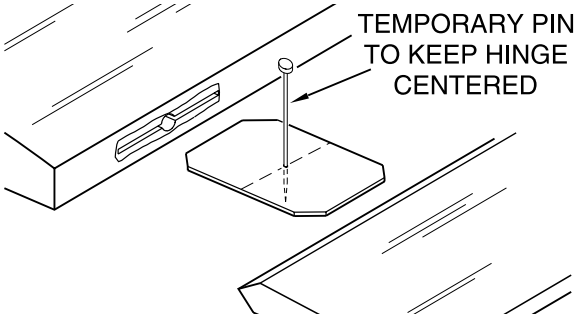


❏ 3. Install the **wing dowels**. Note that the smaller dowel (7mm x 90mm) should be installed into the aft holes.

❏ 4. Join the **rudder** to the fin using the following procedure:

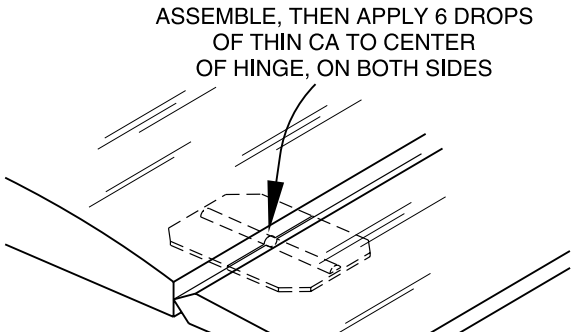


A. Drill a 3/32" [2.5mm] hole, 1/2" [13mm] deep, in the center of the hinge slot. If you use a **Dremel® MultiPro™** for this task, it will result in a cleaner hole than if you use a slower speed drill. Drilling the hole will twist some of the wood fibers into the slot, making it difficult to insert the **hinge**, so you should reinsert the knife blade, working it back and forth a few times to clean out the slot.



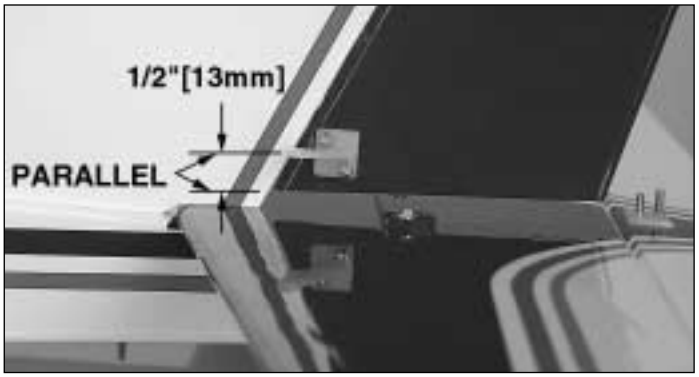
B. If the hinges don't remain centered, remove the rudder and insert a pin in the center of the hinges.

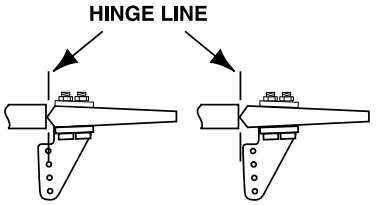
C. Attach the rudder to the fin using three hinges. Make sure there is approximately a 1/64" [.04mm] gap between the rudder and the fin.

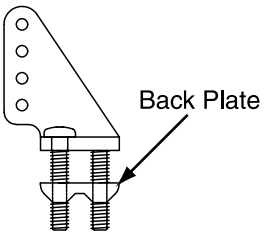


D. Add six drops of thin CA to the center of the hinges on both sides. Use a paper towel to absorb excess CA from the hinge gap before it cures. **Do not use CA accelerator;** allow the CA to cure slowly.

❏ 5. Use the same hinging method to join the **elevator** to the stab.



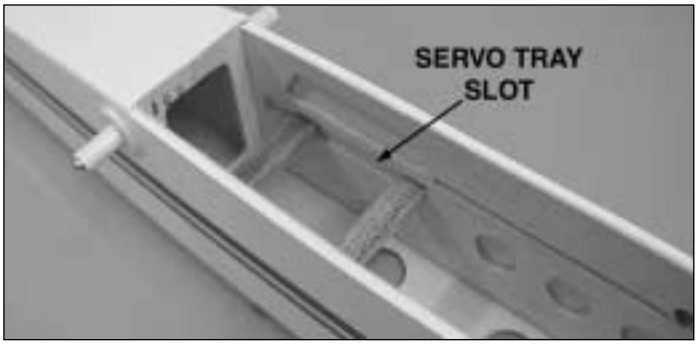




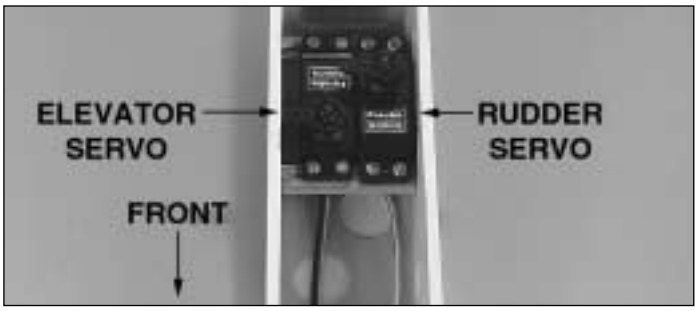
❏ 6. Position one of the **nylon control horns** 1/2" [13mm] up from the bottom of the rudder. Align the horn parallel to the bottom of the rudder. Drill two 3/32" [2.5mm] holes through the rudder using the horn as a guide. Harden the holes using two or three drops of thin CA. Attach the nylon control horn to the rudder using two 2mm x 15mm screws. Tighten the screws into the horn back plate on the opposite side of the rudder.

❏ 7. Position the remaining control horn in line with the center of the fuselage on the bottom of the elevator. Attach the control horn to the elevator using two 2mm x 15mm screws. Tighten the screws into the horn back plate on the opposite side of the elevator.

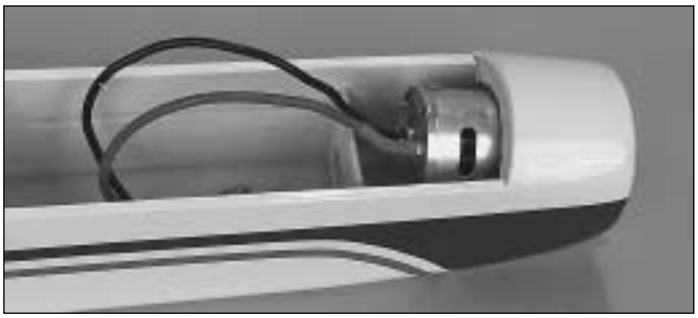
Radio & Motor Installation



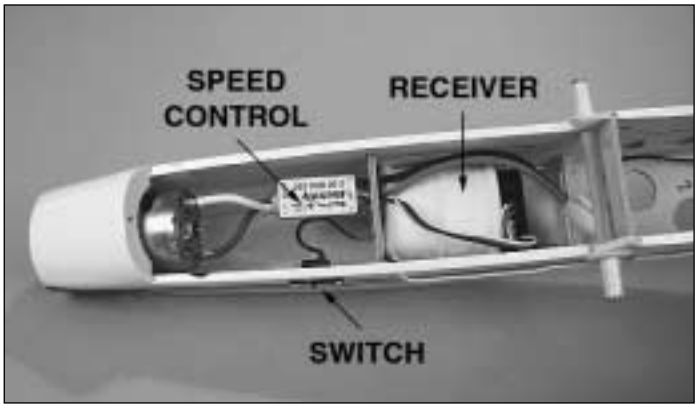
❑ 1. Find the two hardwood sticks. The longer one is 1/4" x 3/8" x 2-1/8" [6.3mm x 9.5mm x 54mm] and it should be inserted at the front of the radio tray slot. Insert the shorter stick (1/4" x 3/8" x 1-15/16" [6.3mm x 9.5mm x 49mm]) at the back of the slot. Test fit the servos you are going to use between the sticks and then glue the sticks in place with CA.



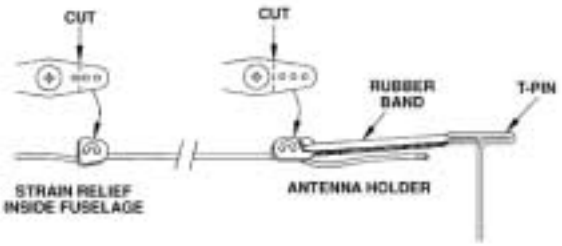
❑ 2. Install the servos using the hardware included with your **radio system.** Note the location of the servo output shafts in the photo.



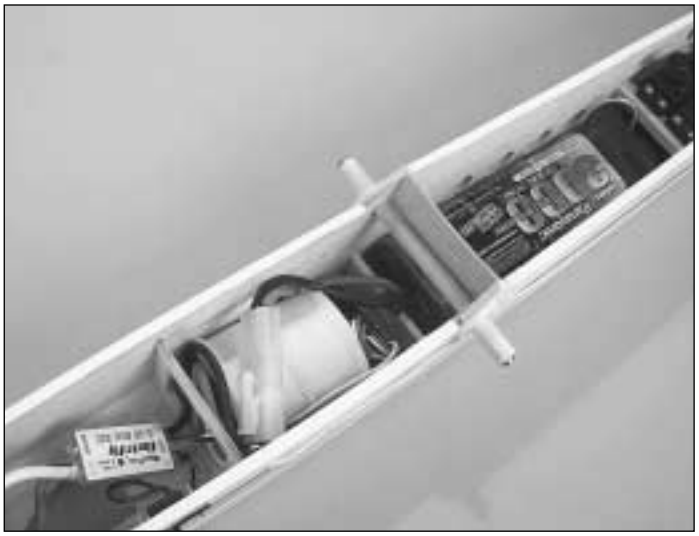
❑ 3. Install the motor on the **firewall** using two supplied 3mm x 10 mm bolts and two 3mm washers.



❑ 4. Install the **receiver, speed control and switch.** Follow your speed control manufacturer's instructions closely. Use thin foam to cushion the receiver. A Great Planes C-30 speed control (GPMM2030) was used on the instruction model.



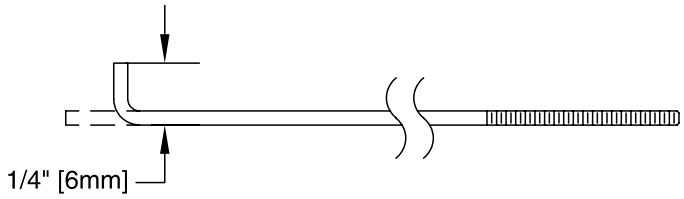
❑ 5. Make a hole on the side of the fuselage and route the receiver antenna through the hole to the rear end of the fuselage. Use fuel tubing through the hole to work as strain relieve system. Also, use a cut piece of servo arm and guide the antenna through at least two holes to act as a retainer. Tie the end of the antenna to a small rubber band and use a pin to hold the antenna in place at the rear fuselage.



❑ 6. Install the motor battery. Make sure there is enough room in the front compartment to allow the motor battery to slide out. The space is tight, so an option to remove the battery is to remove the wing.

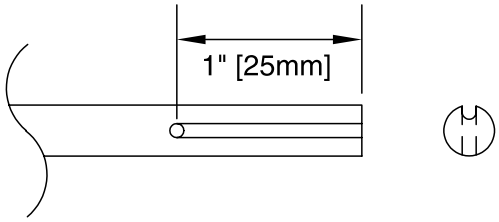
❑ 7. Find the two 12" (305mm) threaded one end pushrod wires and make a cut 5" [127 mm] away from the end on the unthreaded part of the rod. You should end up with two 5"

[127mm] long unthreaded wires and two 7" [178mm] long threaded one end wires.

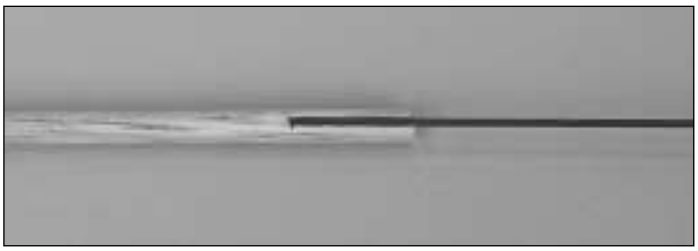


❏ 8. Make a 90° bend 1/4" [6mm] from the non-threaded end in one of the threaded pushrod wires as shown in the sketch. Make the same 90° bend in one end of the remaining threaded and non-threaded pushrod wires. Wipe off each wire using a paper towel dampened with rubbing alcohol to remove any oil.

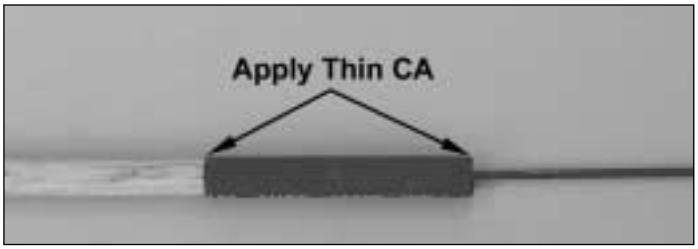
❏ 9. Cut the pushrod dowels from the hardwood dowels. The elevator pushrod dowel should be 12" [305mm] long. The rudder pushrod dowel should be 10" [255mm] long.



❏ 10. Drill a 5/64" [2mm] hole 1" [25mm] in from both ends of each pushrod dowel. Cut a groove in each pushrod dowel from the hole to the end of the dowel.

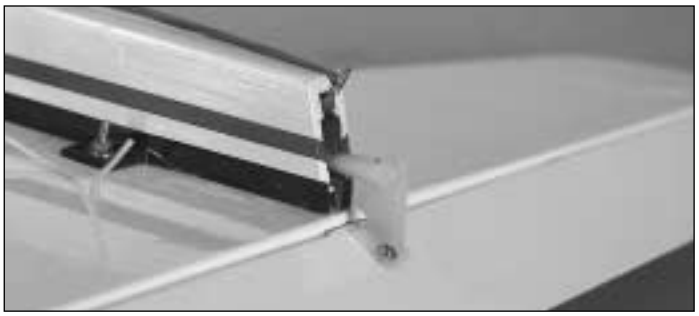


❏ 11. Insert the 90° bend of one of the threaded pushrod wires into one pushrod dowel. Insert the 90° bend of one of the non threaded pieces of wire into the hole on the opposite end of the pushrod dowel. Tack glue the wires in place with a couple drops of CA. Repeat this procedure to make the other pushrod.

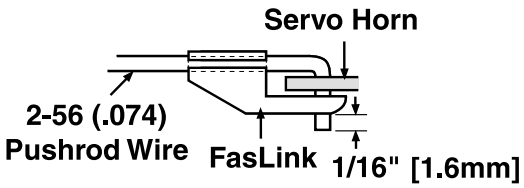


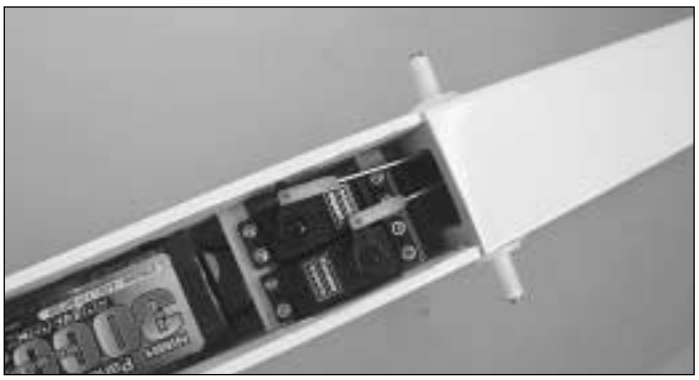
❏ 12. Use the heat shrink tubing at all the ends of each of the pushrod dowels to hold everything in place as shown in the photo. Use a heat gun to shrink the tubing. Apply a few drops of thin CA to each end of the heat shrink tubing to secure it.

❏ 13. Install the rudder pushrod. Thread a clevis 14-turns onto the pushrod. Attach the clevis to the control horn at the 4th hole from the inside. Bend the pushrod as necessary to allow for free movement. Use a silicone retainer to secure the clevis.



❏ 14. Install the elevator pushrod. Center the elevator and thread the clevis 14-turns onto the pushrod. Attach the clevis to the control horn at the 4th hole from the inside. Trim the opening at the rear of the fuselage as necessary to allow the pushrod to move freely. Use a silicone retainer to secure the clevis.

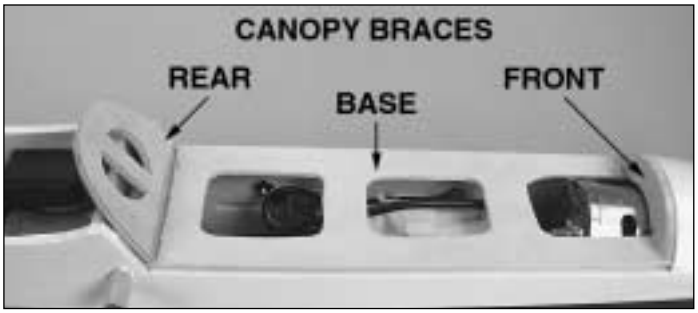




❏ 15. Center the rudder and the rudder servo arm. Attach a FasLink onto the pushrod in the radio compartment and

connect it to the servo arm at the last hole. Follow the same procedure for the elevator. Make sure all the FasLinks are securely attached. Cut the excess pushrod 1/16" [1.6mm] from the FasLink.

Canopy Installation



❏ 1. Place a piece of wax paper between the fuselage and the **bottom canopy base.** Situate the **front canopy brace** and **rear canopy brace** in place. Press all braces against the fuselage to obtain their correct position. Glue the front and the rear braces to the base with medium CA. The wax paper will prevent the braces from accidentally being glued to the fuselage. **Note:** You may have to sand the braces slightly to get them to fit. For the instruction model we used Great Planes Plan Protector™ (GPMR6167).

❏ 2. Make a 9/64" [3.6mm] hole in the front canopy brace and fuselage as shown. Insert the **small hardwood dowel** into the hole until it extends all the way into the fuselage hole. Glue in place with thick CA. Be careful not to glue the dowel to the fuselage.

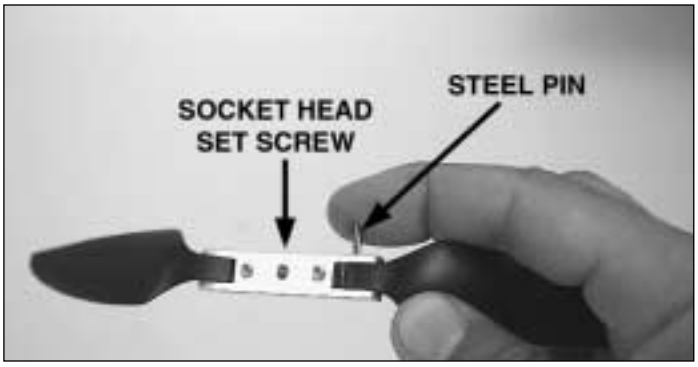
❏ 3. Test fit the **canopy** onto the canopy braces. Use Pacer Formula 560 to glue the canopy to the canopy braces.

❏ 4. Trim the canopy flush with the base and the front of the canopy braces but do not trim the back yet!

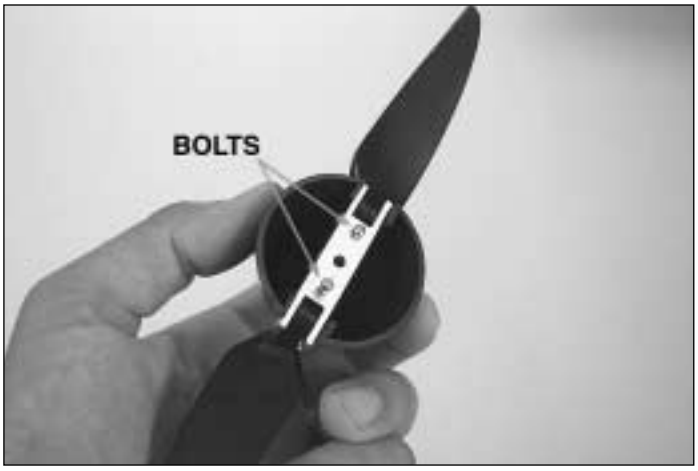
❏ 5. Temporarily mount the **wing** in place on the fuselage. Very carefully trim the back of the canopy, **A LITTLE AT A TIME,** to fit over the wing. Curved tip scissors work well for trimming the canopy.

❏ 6. Open the air intake on top of the canopy.

Folding Propeller Installation



❏ 1. Install the blades onto the folding propeller's hub using the steel pins supplied. Install the socket head set screw provided in the folding propeller's hub. This set screw will be used to tighten the folding propeller to the motor's shaft.



❏ 2. Install the spinner onto the folding propeller's hub using the bolts provided as shown above

❏ 3. Install the folding prop onto the motor's shaft and tighten the hub's set screw.

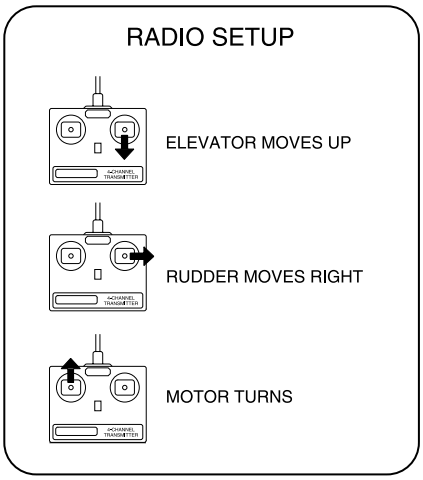
Final Hookups & Checks

❏ 1. The canopy is held in place with a rubber band. Loop a medium size rubber band through the cut-out in the rear canopy brace. Thread the rubber band through itself and then hook it on the little extension on the fuselage former. To remove the canopy, pick up on the back until the dowel is clear of the fuselage. To reinstall the canopy just do the opposite.

❏ 2. Trim the covering at the bottom of the airplane to open the outlet holes. This will allow the cooling air for the motor and motor battery to exit the fuselage.

Note: A piece of self-adhesive foam rubber weather stripping (not included) can be applied to the front of the fuselage bottom to help protect it from getting nicked up during landings.

Radio Settings

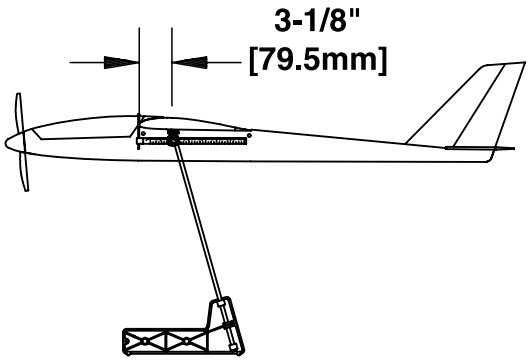


Use the sketch to make sure the control surfaces are moving the correct directions.

The control throws are as follows:

	UP	DOWN
Elevator	1/2" [13mm]	1/2" [13mm]
	LEFT	**RIGHT**
Rudder	1-1/2" [38mm]	1-1/2" [38mm]

Balance the Model



Note: This section is very important and must not be omitted! A model that is not properly balanced will be unstable and possibly unflyable.

The balance point (C.G.- Center of Gravity) is located directly under the wing's main spar 3-1/8" [79.5mm] from the LE. This is the point at which your model should balance for your first flights. Later, you may wish to shift the balance up to 3/8" [9.5mm] forward or aft of the spar to change the flying characteristics of your Spectra ARF. Moving the C.G. forward of the spar will add some stability to the electric sailplane but it will decrease its overall performance and increase its stall speed. Moving the balance behind the spar makes the model more agile with a lighter and "snapier" feel and improves the Spectra ARF's response to air currents. It also makes the model less stable and can cause the model to "tuck under" or dive when its flying speed increases. If you fly the Spectra ARF with its C.G. behind the spar, pay close attention and do not let it gain excessive speed. If it does "tuck under" and you have plenty of altitude, give the airplane a little "down" elevator and allow it to go under. When it starts to climb up back of the outside loop its airspeed will drop and you can pull out with some "up" elevator or roll out with full rudder. If you do not have plenty of altitude, gently pull out with "up" elevator but be careful and do not jerk it up or you may overstress the wing structure.

With the wing attached to the fuselage, and all parts of the model installed (ready to fly), lift the model by picking it up with a finger on each bottom inner spar. If the tail drops when you lift, the model is "tail heavy" and you must add weight to the nose to balance. If the nose drops, it is "nose heavy" and you must add weight to the tail to balance. The model should hang with a **slight** nose down attitude. Add lead to the compartment at the front of the fuselage to correct a tail heavy model.

DO NOT ATTEMPT TO FLY WITHOUT FIRST ACHIEVING THE PROPER BALANCE.

Checking for Warps

This is a very important step and should be done occasionally throughout the flying season. A sailplane's wing is most efficient when it is not twisted or warped at all. "Washout" (wing trailing edges twisted up at the tip) helps make a poor wing design fly better by adding some stability (preventing stalls) at slow speeds but it cuts down on the wing efficiency at normal speeds. The SPECTRA ARF's wing is designed to fly well at slow speeds without any washout, and therefore we recommend you check to make sure the wings are "flat" using the following procedure:

Set the wing so an inner panel is resting on a flat surface. Any warp (twist) will show up by causing a corner of the panel to rise off the work surface.

To remove the warp, gently twist the wing in the opposite direction while a helper glides an iron or heat gun over the covering on both the top and the bottom of the panel to re-shrink the covering. Hold the twist until the covering cools and then recheck for warps. It may take several tries to get a warp out but it is worth it as you will end up with a sailplane that flies straight and true and responds to air currents like a high performance sailplane should.

Follow the same procedure to check all four wing panels and then go back and double check them. Sometimes you put a warp in one panel while trying to fix another. You should also look at the tail surfaces as they too can warp.

PREFLIGHT

Charge the Batteries

Follow the battery charging procedures in your radio instruction manual. You should charge your transmitter and receiver batteries the night before you go flying, and at other times as recommended by the radio manufacturer. Charge your motor batteries as recommended by the manufacturer.

Find a Safe Place to Fly

The best place to fly your R/C model is an AMA (Academy of Model Aeronautics) chartered club field. Ask your hobby shop dealer if there is such a club in your area and join. Club fields are set up for R/C flying which makes your outing safer and more enjoyable. The AMA can also tell you the name of a club in your area. We recommend that you join AMA and a local club so you can have a safe place to fly and

also have insurance to cover you in case of a flying accident. (The AMA address is listed on page 2 of this instruction book).

If a club and its flying site are not available, you need to find a large, grassy area at least 6 miles away from any other R/C radio operation and away from houses, buildings and streets. A schoolyard may look inviting but it is usually too close to people, power lines and possible radio interference.

If you are not thoroughly familiar with the operation of R/C models, ask an experienced modeler to check to see that you have the radio installed correctly and that all the control surfaces do what they are supposed to.

Range Check Your Radio

Wherever you do fly, you need to check the operation of the radio before every time you fly. This means with the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have someone help you. Have them stand by your model and, while you work the controls, tell you what the various control surfaces and your motor are doing.

AMA SAFETY CODE (EXCERPTS)

Read and abide by the following Academy of Model Aeronautics Official Safety Code excerpts:

General

1. I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously successfully flight tested.

2. I will not fly my model aircraft higher than approximately 400 feet [120m] within 3 miles [2km] of an airport without notifying the airport operator. I will give right of way to, and avoid flying in the proximity of full-scale aircraft. Where necessary an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.

3. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

Radio Control

1. I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.

2. I will not fly my model aircraft in the presence of spectators until I become a qualified flyer, unless assisted by an experienced helper.

3. I will perform my initial turn after takeoff away from the pit, spectator and parking areas, and I will not thereafter perform maneuvers, flights of any sort or landing approaches over a pit, spectator or parking area.

FLYING

First of all, if you are flying with other modelers check to make sure they are not flying or testing on the same frequency as your model.

Try to find an experienced pilot to help you with your first flights. Although the SPECTRA ARF is very easy to fly, an experienced pilot can save you a lot of time and possible aggravation by helping you get your model in the air smoothly.

Trim Flights

It is a good idea to do a couple of trim flights, without the motor running, before each flying session to make sure the plane is still in trim and the radio is working properly. The model will survive a hard landing from 5 feet [1.5m] much better than it will one from several hundred feet. The first few trim flights should be done over a grass field. The longer the grass the better (more cushion).

Turn on the transmitter first and then the receiver. Hold the SPECTRA ARF under the wing with the nose pointed slightly down and directly into the wind. Do not run the motor for these test flights. It is very important that you launch the model with the wings level and the nose pointing at a spot on the ground about 50 feet [15m] in front of you. Have a friend stand off to the side of you and tell you whether the nose is pointing up or down. If the SPECTRA ARF is launched with the nose up or launched too hard it will climb a few feet, stall and fall nose first straight down. With the nose pointed down slightly the sailplane will accelerate down until it picks up enough flying speed then level off and glide forward. The plane should be launched with a gentle push forward. With a little practice you will be able to launch it at just the right speed so it soars straight ahead in a long and impressive glide path. Adjust the trims on your transmitter to get the plane to fly straight ahead in a smooth glide path.

Once you get the hang of launching it you can try turning the plane during the trim flights by gently applying a “touch” of right or left rudder. You can also try “flaring” the landings by slowly applying a touch of up elevator (pull the stick back) as the plane nears the ground. The SPECTRA ARF will continue to fly just a few inches off the ground for a surprisingly long distance. It is important you don’t “over-control” the model. Make any control inputs slowly and smoothly rather than moving the transmitter sticks abruptly.

First Flights

Find a BIG, OPEN field for your first flights. The bigger the better as you won't have to worry about where you need to land. Ground based objects (trees, poles, buildings, etc.) seem to attract model airplanes like a magnet. **Again, we would like to recommend that you find an experienced pilot to help you with these first flights.**

Note: You need to remember that your radio control responds as if you were sitting in the cockpit. When you push the transmitter stick to the right, the rudder moves to the plane's right! This means that when the plane is flying towards you it may seem like the rudder controls are reversed (when you give "right" rudder the plane turns to your left–which is the plane's "right"). It is sometimes easier to learn to fly the plane if you always face your body in the direction the plane is flying and look over your shoulder to watch the model.

Turn on your transmitter and then your receiver and hold the model as you did for the hand launched test flights. Hold it firmly and move the throttle stick up to test the motor operation. When satisfied that everything is responding as it should, launch the model straight into the wind just as you did without the motor running. It is important that you do not throw the airplane up or it may stall and hit the ground. If you launch it level or slightly down the airplane will accelerate and start climbing on its own.

Don't worry about accomplishing very much on your first flights. Use these flights to get the "feel" of the controls and the SPECTRA ARF's flying characteristics. For the first few seconds of the flight allow the airplane to gently climb straight ahead. Try to keep the plane upwind and just perform some gentle "S-turns" (always turning into the wind) until it is time to set up for landing. Have a helper adjust the trims on your transmitter (a little at a time) until it has reached a comfortable soaring altitude (200' - 300' [60 - 90m]). Turn the motor off and allow the SPECTRA ARF to soar around, keeping the airplane upwind of yourself. When you feel its getting too low, turn the motor back on and climb back to altitude. It can be very hard for a beginner to fly a plane straight towards him as he would have to do if the plane were downwind. While the SPECTRA ARF is gliding have a helper to adjust the trims on your transmitter (a little at a time) until the plane will fly straight and level with the transmitter sticks in their neutral position.

When you can hear the motor starting to die off and/or the plane does not want to climb anymore it is time to shut off the motor for the last time (especially if you have BEC.) It is important to remember that you no longer have enough power to climb out again, so you only get one chance at landing. When it is time to land, just continue performing the gentle "S-turns" upwind and let the plane glide onto the ground. Don't worry about where the plane lands–just miss any trees, etc. If you need to "stretch" a landing you can switch the motor back on but do not expect it to be able to carry you very far. When NiCd Batteries start going dead, they really go dead in a hurry. An alternative to allowing the battery to become weak before shutting the motor off for good is to time the motor runs so you can leave enough "juice" in the battery for a couple of "go arounds" if needed.

Note: BEC is a system offered by most modern speed controls that allow you to get rid of the radio battery and use the motor battery as the means for supplying power to the radio. The BEC will cut power to the motor when the motor battery is low on charge but it will still give the modeler enough power to use the radio normally for a short time until landing. Keep in mind that while there is still enough charge to use the radio when the motor battery is low, so you should land within 10 to 15 minutes of motor cut out time.

Practice flying directly into the wind (upwind of yourself) without letting the plane get off course, and then turn and come downwind until the plane is even with you and try it again. When you are comfortable with flying directly into the wind, start letting the plane go behind you (downwind) a little before you start back upwind. Continue this until you can fly directly towards you from downwind without getting disoriented. At this point you can start to establish a "landing pattern" and bring the sailplane in for a landing from downwind. **Always land into the wind.** This enables the plane to be flown as slowly (ground speed) as possible for accurate and damage free landings.

It is probably not a good idea to try and fly around at a low altitude with the motor on during your first flights. This will cause the airplane's speed to increase and make the controls more responsive which is just what a beginner does not need.

The SPECTRA ARF will climb to altitude several times on a single charge allowing you to have flights well over ten minutes without finding any "lift". You should be able to get two full climbs above 500' [150m] on a single charge although there are many factors that figure into this.

Thermal Flying

Thermal soaring is one of the most intriguing of all aspects of flying and the SPECTRA ARF was designed to excel at thermal soaring even in the hands of a novice. It can be hard for the average person to understand how a plane can fly for a long time and gain altitude **without a motor!**

Facts About Thermals

Thermals are a natural phenomenon that happen outside, by the millions, every single day of the year. Thermals are responsible for many things including forming several types of clouds, creating breezes, and distributing plant seeds and pollen. If you have ever seen a dust devil (which is nothing more than a thermal that has picked up some dust), you have seen a thermal in action. Their swirling action is very similar to that of a tornado but of course much gentler. Most thermals have updrafts rising in the 200 - 700 feet [60 - 220m] per minute range but they have been known to produce updrafts of over 5,000 feet [1500m] per minute (that's over 50 miles/hour [30km/h] straight up!) These strong thermals can rip a plane apart or carry the plane out of sight before the pilot can get out of the updraft.

Thermals are formed by the uneven heating of the earth and buildings, etc. by the sun. The darker colored surfaces absorb heat faster than the lighter colors which reflect a great deal of the sun's energy back into space. These darker areas (plowed fields, asphalt parking lots, tar roofs, etc.) get warmer than the lighter areas (lakes, grassy fields, forests, etc.). This causes the air above the darker areas to be warmer than the air over the lighter areas and the more buoyant warm air rises as the cooler, denser air forces its way underneath the warmer air. As this warm air is forced upward it contacts the cooler air of the higher altitudes and this larger temperature difference makes the thermal rise quicker. The thermal is gradually cooled by the surrounding cooler air and its strength diminishes. Eventually the thermal stops rising and any moisture contained in the once warm air condenses and forms a puffy cumulus cloud. These clouds, which mark the tops of thermals, are usually between 2000 and 5000 feet [600 and 1500m] high.

Thermal Soaring

It takes a lot of concentration to thermal soar effectively. An electric sailplane can fly along the edge of a thermal and unless the pilot is carefully watching the model he may not realize the opportunity to gain some altitude. Because most thermals are relatively small (a couple hundred feet in diameter or less at 400' [120m] altitude) compared to the rest of the sky, the sailplanes will rarely fly directly into the thermal and start rising. Generally, the electric sailplane will fly into the edge or near a thermal and the effects the thermal has on the plane may be almost unnoticeable. As the electric sailplane approaches a thermal, the wing tip that reaches the rising air first will be lifted before the opposite wing tip. This causes the plane to "bank" and turn away from where we would like the plane to go.

When you are thermal soaring, try to fly as smoothly and straight as possible. Trim the plane to fly in a straight line and only touch the controls when you have to. Watch the electric sailplane carefully and it will tell you what it is encountering. When the electric sailplane flies directly into a thermal it will either start rising or stop sinking. Either case is reason enough to start circling (especially in a contest where every second counts). Fly straight ahead until you feel like you are in the strongest lift, fly a couple of seconds farther (so your circle will be centered in the strongest lift) and then start circling in a fairly tight but smooth turn. When the electric sailplane is low the turns have to be tighter to stay in the strongest lift. As the plane gains altitude, the turns can be larger and flatter. The flatter the turn, the more efficient the plane is flying, but don't be afraid to really "crank" it into a steep bank when you are low. If you see the plane falling off on one side of the turn, move your circle over into the stronger lift. Thermals move along with the wind so as you circle you will be swept along with it. Be careful when thermaling, that you don't get so far downwind you can't make it back to the field to land.

If the electric sailplane is flying along straight and all of a sudden turns, let the plane continue to bank (you may have to give it some rudder to keep it banking) until it has turned 270-degrees (3/4 of a full circle). Straighten out the bank and fly into whatever turned the plane. If you encounter lift, and you won't every time, start circling just as you did when flying directly into a thermal.

Thermals are generated all day long, but the strongest thermals are produced when the sun is directly overhead. 10:00 am – 2:00 pm seems to be the best time to get those "killer" thermals. Some of these thermals can be very large and you may find it hard to get out of them. If you find yourself getting too high, don't dive the plane to get out of the lift. Sailplanes are very efficient aircraft and they will build up a lot of speed and could "blow up" in the rough air of a thermal. The easiest way to lose altitude is to apply full rudder and full up elevator. This will put the plane into a tight spin that will not over stress the airframe but it will enable it to lose altitude very quickly. This is especially helpful if the sailplane gets sucked into a cloud or it gets too high to see. The twirling action will give the sun a better chance of flashing off of the wing and catching your attention. When you are high enough and want to leave the thermal, add a little down trim to pick up some speed and fly 90 degrees to the direction of the wind. If you are not real high and want to find another thermal, you may want to look upwind of the last thermal. The same source that generated this thermal is probably producing another. Just watch out for "sink" which is often found behind and between thermals.

As you might expect, with all this air rising, there is also air sinking. This air is the electric sailplane pilot's nightmare that can really make soaring challenging. "Sink" is usually not as strong as the thermals in the same area, but it can be very strong. Down drafts of many hundreds of feet per minute are common on a good soaring day. These down drafts can make a sailplane look like it is falling out of the air. Because of this, it is important that you do not let the sailplane get too far downwind.

When encountering sink, immediately turn and fly 90 degrees to the direction of the wind (towards you if possible). Apply a little “down elevator” and pick up some speed to get out of the sink as fast as possible. Every second you stay in the sink is precious altitude lost.

Pointers for Contest Soaring

Pay Attention! – Pay close attention to the electric sailplanes flying before you, watch them and try to establish where and when the thermals are being formed. Thermals are often formed in cycles and can be fairly regular, so if you keep track of the time intervals you will have a pretty good idea of when and where a thermal may be generated.

Watch The Birds! – Thermals suck up small insects that many birds love to eat. A bunch of swallows flying around in one area may indicate a thermal. Soaring birds (hawks, vultures, eagles etc.) are the best thermal indicators. They not only show you where the thermal is but they also show you where the center is. These “Masters of the Sky” will often fly right along with electric sailplanes.

Practice Those Landings! – Most thermal contests are won or lost during the landing. Establish a particular landing pattern and try to stick to it for all landings. Learn to shift your pattern to account for the wind and the particular flying field characteristics.

Concentrate! – Keep your eye on your electric sailplane during your contest flights. Have a helper or your counter watch the other planes in the air. Sometimes your electric sailplane will wiggle so quickly or gently that you may miss it if you are not paying close attention. If you find a productive thermal, don’t leave it because your helper tells you that someone else has found a different one.

Know Your Electric Sailplane! – Learn what your electric sailplane will and won’t do and fly within this envelope. This will allow you to ride thermals downwind while knowing when you have to head back to make your landing safely.

Learn From The Wind! – Keep track of which way the wind is blowing. If the wind suddenly shifts, there is some thermal action fairly close to you. The air is probably being either sucked up into a thermal or falling out of some sink. In either case it is often a good idea to fly in the direction the wind is blowing if your sailplane is in the general area. This will take you towards a thermal if there is one or away from the sink, both of which are desirable.

Have a ball! Remember to always stay in control and fly in a safe manner.

BUILDING NOTES

Kit Purchased Date: _____

Where Purchased:_____

Date Construction Started: _____

Date Construction Finished: _____

Finished Weight: _____

Date of First Flight: _____

FLIGHT LOG